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Ratoon Stunting Disease Yield Trials

By C. G. HUGHES

The history of ratoon stunting disease in Queensland dates back to the beginning of 1945, when, following a dry spring and early summer, many instances of very slow ratooning were seen in the variety Q.28 in the Mackay district. Subsequent test plantings and observations of chance comparable plantings of diseased and healthy material showed very definitely that there was a serious loss of tonnage in ratoon crops of Q.28. The losses, if any, in the plant crops were on a much smaller scale and it was not until the results of properly replicated trials were available towards the end of 1948 that it was proved that the disease did cause some loss of tonnage in the plant cane. The results of these trials (and the subsequent first ratoons) were published in the January, 1953, number of *The Cane Growers' Quarterly Bulletin*, but the figures for the plant crop are reproduced here (Table 1) in order that some comparisons may be made with the losses recorded with other varieties in the current series of trials. The losses detailed are significant, and it is obvious that the plant crop of Q.28 can be quite seriously affected by the disease. It was not then known that the disease was transmissible and that it occurred in canes other than Q.28. However, ratoons from experimental

TABLE I—Summary of Yields from Five Trials in the Mackay District; Plant crops; Harvested end of 1948; Tons of cane per acre.

Trial No.	Planting Material	Yield	Loss	
			Tons	Per cent.
1	Healthy	28.6		
	Diseased	17.9	10.7	37.4
2	Healthy	36.0		
	Diseased	27.3	8.3	23.1
3	Healthy	30.2		
	Diseased	23.9	6.3	20.9
4	Healthy	40.1		
	Diseased	33.1	7.0	17.5
5	Healthy	37.3		
	Diseased	33.0	4.3	11.5

plantings made in 1947 with inoculated setts were available for examination in the early part of 1949 and they showed that the disease could be transmitted from diseased plants to apparently healthy setts. Proof was soon forthcoming that the disease did in fact occur in canes other than Q.28 and in cane areas outside the Mackay district. With the discovery in 1952 that the discoloured vascular bundles in the nodal tissue within the cane were symptomatic of the disease, a State-wide survey was possible and it was then revealed that the disease occurred in practically all varieties in every district. In a few instances farmers had happened to make comparable plantings in the one field using plants from diseased and comparatively disease-free sources, but in general no estimation whatever could be made as to what damage the disease might be causing.

The survey was not concluded until October, 1952, which meant that the commercial planting was complete for the season everywhere except for an occasional block in South Queensland. Trials with the commercial varieties could not therefore be arranged immediately and a full series was planned for 1953. Eventually trials were planted on farms extending from the Mulgrave area near Cairns in North Queensland to Moreton near Nambour just north of Brisbane. The series suffered the usual misfortunes inseparable from farm plantings and an occasional poor germination or badly lodged crop prevented full information being obtained from all trials.

Although in many instances the only disease-free planting material available was that which had been hot-water treated, which may have tended to place the healthy plots at somewhat of a disadvantage, the results indicated that ratoon stunting could cause considerable losses in the plant crop in many of the popular commercial canes. Some figures were also obtained in the mature crop for c.c.s., length and diameter of stalk and number of stalks per stool. Analysis of these showed that the disease apparently did not cause any difference in number of stalks per stool or in diameter of stalks; the length was sometimes affected and there was some indication that c.c.s. figures might be affected at times. Details of the trials are set out below. It will be noted that in several trials the popular Mackay variety, Q.50, did not show losses when other canes in the same trials suffered severely, but there is not sufficient evidence from the figures presented to justify the conclusion that any other of the varieties tested is of the same order of resistance to the disease. On the other hand, Pindar, with an average loss in tonnage of 14 per cent., Trojan with 23 per cent. and N.Co.310 with 20 per cent. are obviously sensitive to damage in the plant crop and suffer the same order of loss as the susceptible Q.28.

Three trials were planted on the Lower Burdekin using the varieties

Estate of Mrs. B. MURRAY, Meringa, Mulgrave Mill Area

Soil type: Red schist. **Age of crop:** 16 months.
Harvested: September, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre	Average length of stalk
		Tons		Tons	Inches
Pindar	Healthy	47.88	16.08	7.70	102.7
	Diseased	40.87	16.34	6.68	89.6
Q.50	Healthy	46.10	14.88	6.86	103.6
	Diseased	46.38	15.07	6.99	101.1
Trojan	Healthy	45.83	15.32	7.02	91.8
	Diseased	34.27	16.78	5.75	75.4

Badila, Comus, Pindar, S.J.16 and Trojan. The canes grew excellently under these conditions and, there were no differences between the healthy and diseased series. The results of the ratoons will be awaited with interest.

The average tonnages obtained are an indication of the favourableness of the season on this well drained soil in the Mulgrave area. Q.50 apparently was not affected by the disease, since yields from the diseased and healthy series are practically identical, but marked differences are apparent in Pindar and Trojan. In each of these varieties the length of stalk, tons of cane per acre and the tons of sugar per acre were less in the diseased plots. The loss of over one ton of *sugar* per acre is serious by any standard of measurement, especially since these figures are for a plant crop; the losses can be expected to be even higher in the ratoons.

DELECHANTOS AND SON, Giru

Soil type: Alluvial grey clay loam. **Age of crop:** 15½ months.
Harvested: September, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre	Average length of stalk
		Tons		Tons	Inches
Pindar	Healthy	41.67	17.23	7.14	103.4
	Diseased	35.83	16.94	6.05	95.1
Trojan	Healthy	43.25	16.28	7.03	93.3
	Diseased	33.42	17.05	5.67	81.4

Differences between the diseased and healthy series were obvious from an early stage of growth in both varieties and they are reflected in the figures for length of stalk and yields at harvest. The loss of approximately one ton of sugar due to the disease is the same as that obtained in the trial in the Mulgrave area. The differences in c.c.s. are not significant, according to the statistician, and no importance can be attached to them.

JARROTT BROS., Pleystowe, Mackay

Soil type: Black alluvial loam. **Age of crop:** 14½ months.
Harvested: October, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre	Average length of stalk
		Tons		Tons	Inches
P.O.J.2878	Healthy	30.75	16.94	5.21	90.5
	Diseased ..	26.29	16.85	4.43	84.8
Trojan	Healthy	37.04	17.87	6.62	82.7
	Diseased ..	29.58	18.15	5.37	75.8

The healthy series of plots germinated more quickly than the diseased and differences in favour of the healthy were apparent in both varieties right through to harvest when measurements of stalk length and cane and sugar yields showed similar variations. The crop received very little rain from planting time until January and the average yield is lower than would be expected from this excellent soil. The Trojan was obviously seriously affected and P.O.J.2878 also suffered a definite loss. The differences in stalk length were quite obvious in the standing crop burnt before harvest.

C. A. H. WESTCOTT, Sunnyside, Mackay

Soil type: Heavy black clay. **Age of crop:** 12½ months.
Harvested: August, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre	Average length of stalk
		Tons		Tons	Inches
Q.50	Healthy	36.78	16.67	6.13	97.7
	Diseased	35.03	17.64	6.18	92.8
N.Co.310	Healthy	34.75	18.27	6.35	98.5
	Diseased	28.31	18.79	5.32	94.5

Germination was excellent in all plots but growth was slow during the ensuing months and the cane was not out of hand when the wet season rains came in January. The Q.50 arrowed very sparsely and so was able to grow through the open winter, while the arrowed N.Co.310 remained at a standstill. The length of stalk in healthy plots of both varieties was greater than in the corresponding diseased series, but analysis of the yield figures showed that cane and sugar per acre was the same in each for Q.50, while N.Co.310 showed a loss of over six tons of cane and one ton of sugar in the diseased plots.

S. C. REHBEIN, Bargara, Bundaberg

Soil type: Brown volcanic loam. **Age of crop:** 11 months.
Harvested: August, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre	Length of of stalk	No. of stalks per row
		Tons		Tons	Inches	
Pindar	Healthy	25.11	15.01	3.77	73.2	96.3
	Diseased	21.86	15.55	3.4	63.4	89.2
Q.50	Healthy	32.07	13.66	4.38	79.8	116.0
	Diseased	27.65	15.01	4.15	73.8	101.7

Early growth of the trial was hampered by heavy rain soon after planting but eventually, after a small amount of replanting, all plots were away to a good start. The trial was slightly backward owing to wet weather in the early part of 1954, but by mid-June dry weather had caused some deterioration and at harvest red rot and other stem rots were prevalent. Yield figures show that the differences in tonnage indicate a loss of cane due to ratoon stunting but variations in the c.c.s. from one plot to another are so great that no significance can be attached to the figures for sugar per acre. The differences in average stalk length indicate a definite stunting effect from the disease.

WINDERMERE PLANTATION, Bundaberg

Soil type: Red volcanic loam. **Age of crop:** 19 months.
Harvested: September, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre
		Tons		Tons
C.P.29/116	Healthy ..	42.7	15.10	6.45
	Diseased ..	38.4	15.08	5.79

Q.47 and Q.50 were also included in this trial but poor germinations in these varieties necessitated considerable supplying and yield figures for the plant crop at least would be misleading. The differences shown in C.P.29/116 are not significant.

G. F. THOMASON, Bli Bli, Moreton

Soil type: Brown clay loam. **Age of crop:** 12 months.
Harvested: September, 1954.

Variety		Cane per acre	C.c.s. in cane	Sugar per acre
		Tons		Tons
N.Co.310	Healthy ..	34.16	14.97	5.11
	Diseased ..	36.55	15.17	5.54
Pindar	Healthy ..	33.56	14.46	4.85
	Diseased ..	31.50	15.08	4.75

The differences in the tonnages from the healthy and diseased plots are without significance and the ratoon results in this wet locality are awaited with interest.—C.G.S.

Recovery of Q.28

Q.28, once the leading variety in the central area, lost considerable favour due to the ravages of ratoon stunting disease. That the discovery of hot-water treatment of cane for the control of this disease allowed the variety to revert to its original high standard is illustrated by the accompanying two photographs:—

1. A twelve months old crop of Q.28 grown from setts hot-water treated in 1953. M. Barat, a visitor from Madagascar, in the foreground.

2. A three months old crop of first ratoon Q.28 following hot-water treatment of the original planting material. The plant cane from this block was utilised to supply clean cane to the Plane Creek area. The champion stool, irrespective of variety, in the Mackay District Mill Area Competition for 1954 was obtained from this block.

It is pleasing to note that Q.28 has attained its original crop potential with hot-water treatment, as this variety has a definite position in the sugar production of the central area.—C.G.S.

Fig. 40—First ratoon Q.28 grown from hot water treated stocks at West Plane Creek.

Fig. 41—A mature Q.28 crop at North Eton.

"The Sugar Experiment Stations Acts 1900 to 1954"

LIST OF VARIETIES OF SUGAR CANE APPROVED FOR PLANTING, 1955.

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1955.

Mossman Mill Area.

Badila, Cato, Clark's Seedling, Comus, Pindar, P.O.J.2878, Pompey, Q.44, Q.50, Q.57, S.J.4, and Trojan.

Hambledon Mill Area.

Badila, Badila Seedling, Cato, Comus, Eros, Pindar, Q.50, Q.57, and Trojan.

Mulgrave Mill Area.

Badila, Badila Seedling, Cato, Clark's Seedling, Comus, Eros, Pindar, Q.44, Q.50, Q.57, S.J.4, and Trojan.

Babinda Mill Area.

Badila, Badila Seedling, Clark's Seedling, Comus, Pindar, Q.44, Q.50, Q.57, and Trojan.

Goondi Mill Area.

Badila, Badila Seedling, Castor, Pindar, Q.44, Ragnar, Trojan, and Vidar.

South Johnstone Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, S.J.4, Trojan, and Vidar.

Mourilyan Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, S.J.4, Trojan, and Vidar.

Tully Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, Trojan, and Vidar.

Victoria Mill Area.

Badila, Eros, Luna, Pindar, Ragnar, Sirius, and Trojan.

Macknade Mill Area.

Badila, Eros, Luna, Pindar, Ragnar, Sirius, and Trojan.

Invicta Mill Area.

North of Townsville.

Badila, Eros, Pindar, Q.50, Ragnar, and Trojan.

South of Townsville.

Badila, Clark's Seedling, Comus, E.K.28, Pindar, Q.50, Q.57, S.J.16, and Trojan.

Inkerman District.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Pioneer Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.57, S.J.2, S.J.16, and Trojan.

Kalamia Mill Area.

Badila, B.208 Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Inkerman Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Proserpine Mill Area.

Badila, C.P.29/116, Comus, Pindar, Q.28, Q.45, Q.50, and Trojan.

Cattle Creek Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Racecourse Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Farleigh Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

North Eton Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, S.J.2, and Trojan.

Marian Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Pleystowe Mill Area.

Badila, C.P. 29/116, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Plane Creek Mill Area.

C.P.29/116, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Qunaba Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.50, Q.55, and Vesta.

Millaquin Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, Q.55, and Vesta.

Bingera Mill Area.

Atlas, C.P.29/116, Co.290, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, and Vesta.

Fairymead Mill Area.

C.P.29/116, Co.290, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, and Vesta.

Gin Gin Mill Area.

C.P.29/116, Co.301, N.Co.310, Pindar, P.O.J.2878, Q.25, Q.47, Q.49, Q.50, Q.55, and Vesta.

Isis Mill Area.

C.P.29/116, Co.301, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.51, Q.55, and Vesta.

Maryborough Mill Area.

C.P.29/116, Co.290, Co.301, P.O.J. 2878, Q.42, Q.47, Q.49, Q.50, and Q.51.

Moreton Mill Area.

C.P.29/116, N.Co.310, Pindar, Q.28, Q.42, Q.47, Q.50, and Vesta.

Rocky Point Mill Area.

C.P.29/116, N.Co.310, Pindar, Q.28, Q.47, Q.50, Trojan, and Vesta.

NORMAN J. KING,
Director of Sugar Experiment Stations.

Approved Fodder Canes

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1955.

All farmers are advised that the following are the varieties of cane which may be grown for fodder purposes in the sugar mill areas as set out below:—

Mossman, Hambledon, Mulgrave, Babinda, Goondi, South Johnstone, Mourilyan, Tully, Victoria, Macknade, Invicta, Pioneer, Kalamia, and Inkerman Mill Areas:

China, Uba, Co.290, "Improved Fodder Cane," and Co.301.

Proserpine, Cattle Creek, Racecourse, Farleigh, North Eton, Marian, Pleystowe, and Plane Creek Mill Areas:

China, Uba, "Improved Fodder Cane," and Co.301.

Qunaba, Millaquin, Bingera, Fairymead, Gin Gin, Isis, Maryborough, Moreton and Rocky Point Mill Areas:

China, 90 Stalk, "Improved Fodder Cane," C.S.R.1 (also known as E.G.), Co.301, and Q.60.

NORMAN J. KING,
Director of Sugar Experiment Stations.

Hail Damage to Cane at Bundaberg

On the 6th September a hail-storm of fairly high intensity occurred in the Clayton sub-district and in its movement in a north-easterly direction cut a swath about one mile wide through the northern end of Alloway and Calavos and the southern end of South Kalkie.

Fig. 42—The shredding of leaves in mature C.P. 29/116 caused by hail damage.

Damage to young and mature crops was fairly high in the centre of the disturbance, lessening toward the outside. Shredding of leaves of mature cane varied with the variety. Generally the variety C.P.29/116 (Fig. 42) showed a higher degree of shredding than other varieties and in many instances C.P. 29/116 which had arrowed had the appearance of complete defoliation.

Fig. 43—Autumn plant Q.50 with leaves badly shredded.

Large jagged pieces of hail which fell in the Clayton area severely damaged mature Q.50 on one farm (Fig. 43) and rapid development of red rot occurred in badly bruised stalks (Fig.44). Fortunately this crop was harvested with a minimum of delay and no depreciation of c.c.s. occurred.

Fig. 44—Cane stalks bruised by hail stones.

Hail damaged mature C.P.29/116 and P.O.J.2878 showed a reddening of the tissue within the bruised area and while this damaged tissue will undoubtedly adversely affect c.c.s. values no development of stem rots occurred.

Fig. 45—The loss of cover resulting from hail damage to young cane.

Foliage of autumn plant Q.50 and Vesta did not shred but was broken down by the weight of hail and ground cover reduced (Fig. 45). Growing points were not damaged and continued growing. Recovery has been good and it is considered that ultimate yields will not be materially affected by the loss of leaf surface.—H.G.K.

Q.58

By C. G. STORY

The variety Q.58 was originally selected at the Mackay Sugar Experiment Station on the 2nd July, 1946. Its parentage is P.O.J.2878 x Co.290, which has been a useful cross in this district.

The recorded data on this variety since its original selection makes interesting reading. Its trial period extended over a variety of seasonal conditions from severe drought to good production years. The original stool of cane was below the standard of many others selected with the same parentage but, whereas these were subsequently eliminated in trials, results from this variety remained at a high level.

Original Seedling Stool:

No. of stalks	13
Stalk Thickness ..	1.1 inches
Stalk Length	5½ feet
Average Refractometer Brix	23.94
Average Brix of Standard (Q.28)	21.82

First planting from setts:

Average No. of Stalks per stool	6.37
Thickness	1.1 inches
Length	6 feet
Average Brix	24.3
Average Brix Q.28 ..	23.3
Germination	Excellent

	Plant Nov., 1948		Ratoon Nov., 1949		Total cane per acre	Total sugar per acre
	Tons cane per acre	c.c.s.	Tons cane per acre	c.c.s.		
Q.58 ..	29.64	17.66	30.9	17.24	60.54	10.56
Q.28 (1) ..	31.13	16.10	23.7	13.52	54.83	8.21
Q.28 (2) ..	25.44	16.77	23.5	13.26	48.94	7.38

The yield observation trial period of two years with Q.28 as a standard produced the following results. Plots of Q.28 occurred on two sides of the plot of Q.58, and the trials were harvested in November, 1948, and November, 1949.

This variety did not show any dry weather effects in 1949, although other seedlings in the trial were showing dead stools of cane by September.

The seedling was one of six planted in a randomised trial with Q.50 as the standard on the 12th August, 1949. The plant crop was harvested in August, 1950, and the first ratoon crop in October, 1951. Trial results were as follows:—

	Plant		Ratoon		Total cane per acre	Total sugar per acre
	Tons cane per acre	Tons sugar per acre	Tons cane per acre	Tons sugar per acre		
Q.58 ..	35.74	5.82	27.70	5.18	63.44	11.00
Q.50 ..	33.5	5.11	26.35	4.80	59.85	9.91

The remarks at harvest were:—"This variety has a good compact stool with thin stalks which yield well; it is a soft cane to cut and has good sugar early. It would be very suitable for mechanical harvesting as it has an erect habit with good cover and was not affected by wind in the cyclonic blow

of 1950, when many other varieties lodged. It has definite promise as a variety for the central area. It should remain erect on good soil." Propagation observation plantings in the area during 1951 confirmed the above opinion.

Q.58 was planted as a second standard to Q.50 in a further randomised trial in 1952. The plant crop was harvested in October, 1953, at the age of 14 months, with the following results:—

	Tons Cane per acre	Tons sugar per acre
Q.58	27.88	5.19
Q.50	28.64	5.08

The first ratoon crop of this trial promises that Q.58 will maintain its relative production level. The variety has been used as one of the standards in a further randomised trial planted in 1954 with five promising seedlings which compared favourably with Q.50 in trials on canegrowers' properties.

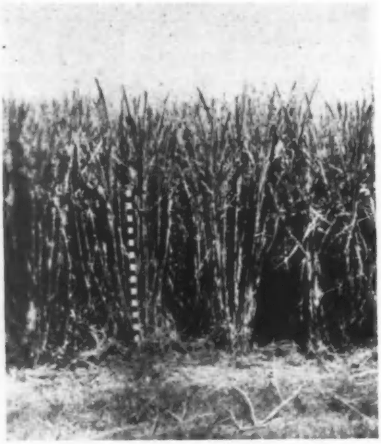


Fig. 46—A stand of 12 months old first ratoon Q.58.

Following the hot-water treatment of Q.58 in 1953, plantings were made on a range of soil types in the area from alluvials to second-class forest soils. The subsequent crops harvested for plants in 1954 were good, with a number of excellent crops in the area—one on black pug clay loam yielded 48 tons of plants per acre and another on alluvial soil over 55 tons of plants per acre.

The following summary covers the characteristics of Q.58:—

It is a good germinator with a tendency to the rosetting habit of growth in the early stages; however, this disappears as the crop grows older and it then maintains an erect habit of growth, even on alluvial flats. It has an excellent compact stool with thin stalks which yield a good crop as these stalks are surprisingly heavy.

Although vigorous, it produces a medium length stalk—six to seven feet of millable cane—which is soft at the butt; this is a disadvantage in rat infested areas. It is an easy cane to harvest. The large number of narrow-leafed tops to the stool produce good cover and the resultant heavy body of trash would allow clean burns early in the crushing season. This cover prevents the growth of winter weed—*Ageratum conyzoides*. Normally the variety is a shy arrower.

The hairs produced on the green leaf sheath are not objectionable when stripping for plants. The variety ratoons well with an excellent stool, and it produces sugar early and maintains its sugar. To date observations show that it is not as susceptible to red rot as Q.50.

Thirty varieties were established in a frost trial at Pinnacle, where they were subjected to two heavy and several light frosts. Q.58 was the leading cane of the trial for frost resistance and agricultural qualities. No extravagant claims are made for this variety but, in the years since it was originally selected in 1946, it has

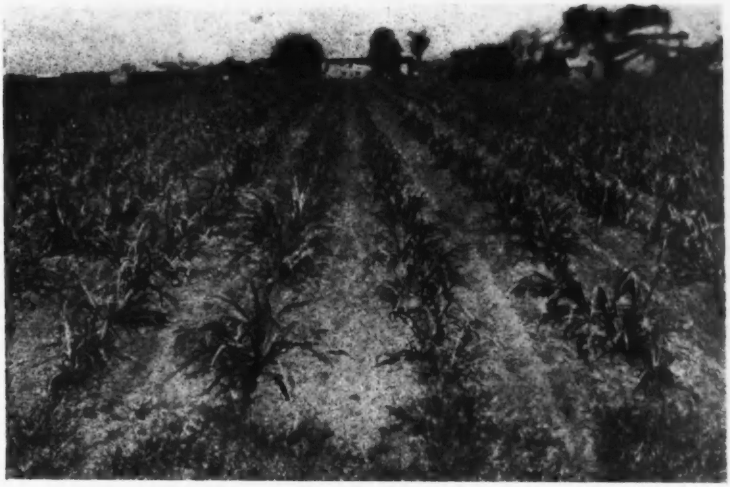


Fig. 47—The early growth stage. Q.58 on the left and Q.50 on the right.

shown promise and given good results comparable with Q.28 and Q.50. It is considered that Q.58 will relieve the burden on Q.50 and assist it to maintain production in the area, thus allowing reduction in the plantings of Q.50, which, at present, constitutes too large a percentage of the district's crop, considering its susceptibility to red rot. Q.58 will be added to the list of approved varieties for the Mackay district in 1955.

Clean Seed for Planting Requirements

As soon as ratoon stunting disease was found to be widespread throughout the sugar cane areas of Queensland it became evident that any cane (apart from newly-raised seedlings), not specifically treated or derived from hot-water treated stocks, would have to be regarded as diseased or suspect, and therefore unsuitable for use as planting material. In order to remedy this situation the Bureau of Sugar Experiment Stations immediately embarked on a vigorous policy of building up clean stocks of all approved varieties throughout the various mill areas. The objective was, of course, the gradual elimination of this diseased cane and its ultimate replacement by healthy material, so that future cane production would not be handicapped by the presence of a disease which is known to exercise a profound influence not only in reducing the tonnage of ratoon crops, but, in the case of some varieties, in reducing plant crop yields as well.

Simultaneously with this effort to build up stocks of clean cane the Bureau also established a number of demonstration plots in which diseased and healthy cane from comparable sources was grown side by side. The quicker and more even germinations as well as the greater vigour and general well-being of the crops from the healthy material, when compared with those from the diseased plantings, soon impressed on most growers the wisdom of taking a little extra trouble to have their cane hot-water treated in order to ensure its

freedom from ratoon stunting disease. As a result, some of the hitherto sceptical ones are now in the forefront in using clean plants and in maintaining adequate supplies for all their future plantings.

In this scheme to provide ample clean seed for all growers the Bureau has necessarily had to rely to a considerable extent on the full support of all Cane Pest and Disease Control Boards to establish facilities for hot-water treatment and in most cases to actually carry out this work. This co-operation was willingly given. In addition assistance was provided in supervising the plantings and conducting follow-up inspections to check on the efficacy of the treatment and to destroy any diseased stools that might volunteer from the previous crop. Indeed the efforts put forward by most Cane Pest and Disease Control Boards were most meritorious and one of these Boards, Inkerman, progressed with its plan to such purpose and its growers were so keen to co-operate, that 43 growers in that area made the whole of their plantings in 1954 from clean cane. Of the remainder all but one secured sufficient clean seed to enable all plantings in 1955 to be made with healthy material. In addition that Board made available hundreds of tons of healthy cane to other areas that were not so fortunately placed for hot-water treating cane, particularly in respect of early planting requirements. Last year, too, the Plane Creek Board made a very effective distribution of clean cane over that mill area, and sufficient healthy cane will be available there in 1955 to more than cover the district's full planting requirements. Doubtless this healthy material will be eagerly used by the majority of growers, but in order to bring the few unco-operative ones into line and prevent the failure of the whole scheme by their apathy *Proclamations have been issued making it obligatory for all growers in the areas of the Inkerman and Plane Creek Cane Pest and Disease Control Boards to plant in future only from healthy stocks.*

Other areas are not so advanced in their supply of clean cane. This may be due to a late start, or because it has been difficult for some Boards to provide, in the short space of time, sufficient clean stocks for all the farms in the many mill areas which they serve. In some instances poor germinations have set back the scheme somewhat, whilst in still other cases growers have had their planting schedules upset by the prolonged wet conditions that prevailed during the 1954 planting season, and many were unable to secure additional labour to make their initial plantings of hot-water treated cane. Whilst recognizing the many disabilities that may have beset some growers in the past, it cannot be overlooked that a small minority has made no attempt whatsoever to secure clean cane. Instead they have adopted a wait-and-see attitude and aimed to benefit from their neighbour's initiative, hoping to secure any excess that may be over after his planting requirements have been satisfied. Be that as it may, it is each grower's responsibility to secure sufficient healthy planting material for his own requirements and it can now be stated that *the Bureau expects to have further proclamations issued in* 1956 *which will make it mandatory on all growers throughout Queensland to plant only from clean stocks. Therefore every grower should acquire in* 1955 *sufficient clean cane to fulfil his total planting requirements for* 1956. The response to last year's warning was generally good, but this final warning is given in ample time beforehand, so no grower will be left in any doubt as to what will be expected in his 1956 planting programme.—R.W.M.

Fodder Varieties for the Atherton Tableland

By J. H. BUZACOTT

Dairy farmers on the Atherton Tableland find fodder canes a valuable standby to carry their herds over the late spring and early summer period when the natural grass pastures become brown and unpalatable. If frosts are severe a frost-resistant fodder cane can prove very valuable in maintaining the milk supply until the grass greens up again; in addition sugarcane is a useful supplementary pig food. In order to assist the farmers of the Atherton Tableland, the Bureau of Sugar Experiment Stations is co-operating with the Department of Agriculture and Stock in a project whereby a number of soft seedling and other varieties of sugarcane are selected at the Northern Sugar Experiment Station each year and planted out on the Kairi Regional Experiment Station on the Tableland. Here the varieties are tested for frost resistance and palatability to stock and any which prove suitable are propagated for ultimate distribution among the dairy and pig farmers of the Tableland.

The project was commenced in 1949 when a number of seedlings suitable for fodder canes were placed in a frost resistance trial at Kairi. Further plantings have been carried out and the seedlings planted there are selected from crosses made for the purpose at Meringa. The crosses used are those which produce soft varieties with heavy foliage and with the leaf sheaths relatively free from hairs. In addition commercial sugar canes which fulfil the requirements, either bred in Queensland or introduced from overseas, are included in the plantings. Three of these have to date shown sufficient promise to warrant propagation. These are China, Co.301 and Q.50. The former of these is somewhat susceptible to drought and is less palatable than the other two which both appear to be relished by

Fig. 48—Fodder varieties bred at Meringa undergoing trial at Kairi Regional Experiment Station on the Atherton Tableland.

stock. Co.301 and Q.50 both produce well-stooled, soft-stalked, comparatively hairless plants with plenty of foliage and are relatively drought resistant, an important characteristic on the volcanic soils of the Tableland.

The photograph, Figure 48, shows an original introduction plot at the Kairi Experiment Station, whilst in Figure 49 the excellent stand in the propagation plot on another field of that same institution is well illustrated. In this latter picture the variety on the extreme right is China. Next to it are two or three rows of Q.50 which have been almost cut out for feeding to pigs, whilst at the left of the plot are five rows of Co.301 partially cut for fodder, and these rows show how this variety has thrived. On the extreme left of the picture can be seen a crop of arrowroot. Tableland farmers are showing considerable interest in the behaviour of these fodder varieties which are performing far better than the fodder canes hitherto available to them. These three varieties have already been tested for disease reaction by the Bureau of Sugar Experiment Stations and have been approved for distribution to the farmers. It is understood that this distribution is now being undertaken at Kairi Regional Station.

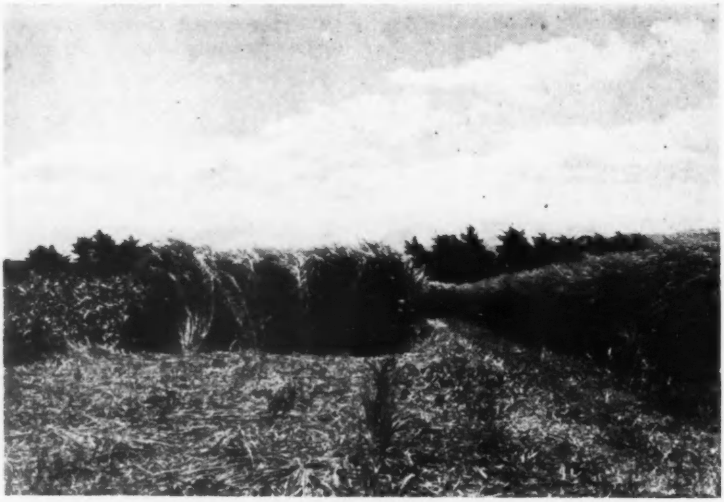
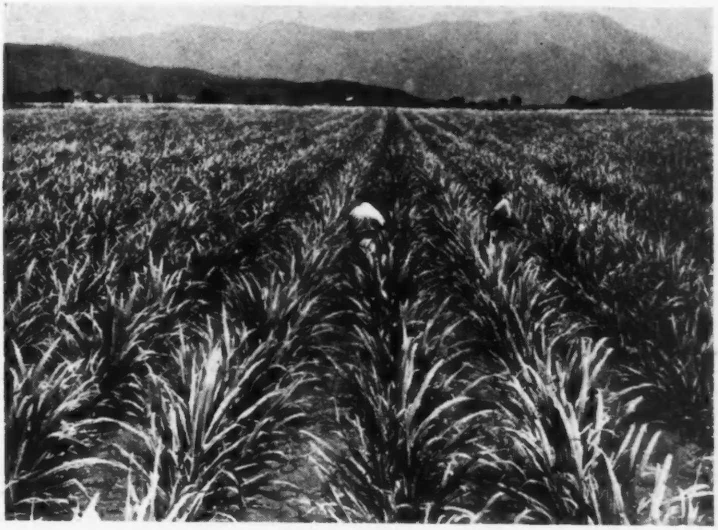
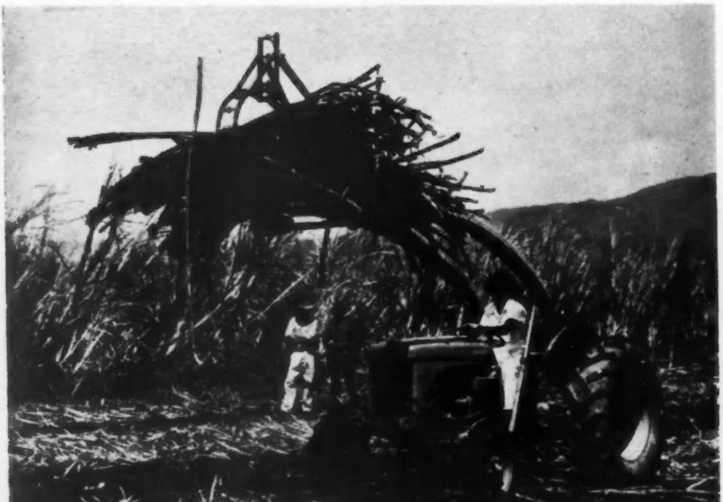


Fig. 49—Three fodder varieties undergoing propagation at Kairi Regional Experiment Station. Five rows at left are Co.301; two rows almost cut out are Q.50; rows on extreme right are China. On extreme left is a crop of arrowroot.

This fodder variety project costs the Bureau of Sugar Experiment Stations very little since it is incorporated in the normal cross-pollination, seedling selection and testing programme. Its value, however, to the farming community can be very great, as sugarcane, apart from being a useful standby in time of drought, is a valuable source of carbohydrates.



Figs. 52-53—These two photographs represent the ideal in young cane stands. The excellent germination, uniform development and good stooling are characteristic of cane grown from disease-free stocks. The top photograph is a field of Trojan and the bottom a block of Cato, both in the Gordonvale area.



Figs. 54-55—Mechanical loading is in the news to-day. On this page the Porter front-end loader mounted on a Ferguson tractor is shown gathering and lifting a bundle of cane prior to placing it on a tram truck.

Figs. 56-57—Here the Nuffleigh loader on a Nuffield tractor is demonstrating its capabilities. The dual front wheels allowed it to operate on soft, wet soil without difficulty.

Diagonal Ploughing

By L. E. RODMAN

An unusual method of ploughing out old cane stubble, which has been practised successfully for the last three years on the farm of Messrs. G. & E. S. Pezzutti of White Rock, near Cairns, is diagonal ploughing. As the name suggests, it is a method whereby the crown is opened diagonally across the paddock from corner to corner and lands are worked on either side.

Fig. 58—Diagonal ploughing at Perzutti's farm, Whiterock, near Cairns

There are several advantages claimed for this type of ploughing and, as with all new ideas, there is at least one disadvantage.

The advantages are:—

1. The plough is not continually cutting old stools, but has about four feet between stools to penetrate to the set depth.

2. Trash can be turned under more efficiently as the angle of cut coincides with the way the old tops are lying and so the disc merely has to roll them into the furrow. When ploughing in line with the row of stools the disc has to cut through the trash. Blunt discs often cause much clogging with this system.

3. It may be said that to plough directly across the drills would be as good as diagonal ploughing. However, the ridges associated with old second ratoons make cross ploughing very rough for the operator whereas in diagonal ploughing the tractor rolls over each ridge one wheel at a time.

The disadvantage is the difficulty in turning. The angles being more acute, there must always be one sharp turn at the end of the furrow and there would also be two corners to plough. The old type drag plough would be unsuitable for this method but the directly attached plough, which is rapidly assuming popularity, would obviate these disadvantages to a large degree.

A Method of Disposal of Crop Residues in North Queensland

By E. A. PEMBROKE

In the high rainfall belt of North Queensland there is often more crop residue to be disposed of after harvest than in other drier areas. Quite often showery weather reduces the effectiveness of the pre-harvest burn and a large volume of trash and other residue remains to be removed after the crop has been harvested. This has been the case particularly during the current harvest when almost continual showers have kept the trash damp and severely limited the effectiveness of the burn.

Fig. 50—Disposal of trash and debris in red soil on a Bartle Frere farm.

Mr. T. J. Trembath, farming on the red volcanic soils of Bartle Frere, in the Babinda area, has for many years employed an effective method of disposing of crop residues and has thus removed the annoyance of unburnt cane tops and bits of cane clogging implements when working ratoons.

After the standing crop has been removed, every sixth interspace is drilled out with a drill plough; the distance between disposal furrows could be widened depending upon the effectiveness of the burn and the amount of crop residue remaining. The residue is then raked up with the conventional hay rake travelling at right angles to the cane row. The rake load is dumped at each disposal furrow across the block and left to dry out for a period depending upon the weather prospects. The windrows are then burnt and any remaining refuse is covered during subsequent ratooning operations. In the following year the interspace adjacent to that previously drilled is opened up to take the crop residue.

In this method of disposing of the crop residues the aim should be to dry out the trash, tops, and discarded sticks as much as possible on the surface before raking, so that when they are later piled in the windrows a good hot burn can be secured before the drill is finally filled in. This will effectively prevent the colonization of beetle borers which can readily build up into large and troublesome populations if their immature stages are merely left to develop in the unburnt crop residue.

In the accompanying photograph the furrow in the centre of the picture shows—

(a) In the distance, the open furrow ready to receive residue.

(b) Middle distance, residue dumped in the furrows.

(c) Foreground, the burnt residue in the furrows.

Queensland Seedlings in South America

Following on the 1954 Conference of the International Society of Sugar Cane Technologists, which was held in the West Indies, the Director of the Queensland Bureau of Sugar Experiment Stations paid a visit to the Republic of Colombia in the north of South America. There at the Agricultural Experimental Station at Palmira the sugar cane breeding work was inspected. Among the interesting crosses developed at that Station are some in which the vigorous Burma *spontaneum* cane figures as a parent. This *spontaneum* is a difficult variety to use in crossing as it flowers seldom and only for a short period.

Hybrids developed at Palmira from Burma *spontaneum* were kindly made available to Queensland by the Colombian authorities and are now in use as parent canes at the Northern Sugar Experiment Station. In return for their generosity, arrangements were made to send to Colombia seed of several Queensland crosses representative of locally bred varieties. Recently a communication has been received from Dr. Ramos Nunez, who is in charge of the sugar cane breeding at Palmira, indicating that the Queensland seed had germinated and the young seedlings were growing well. Photographs were enclosed showing the development of the seedlings and one of these pictures is reproduced here.
—J.H.B.

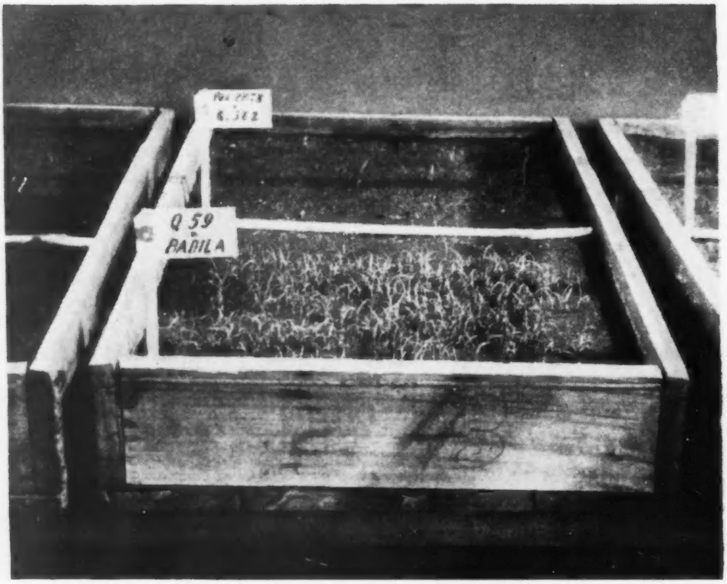


Fig. 51—Seedlings of Queensland varieties growing at Palmira in Colombia, South America.

Bunch Planting

By J. C. SKINNER

Sugarcane breeding involves three processes. Firstly, new varieties are introduced from overseas. In the final analysis all sugarcane varieties in Australia have been introduced because there are no canes native to Australia. New varieties are introduced every year for testing as commercial varieties and to increase the range of material available to the plant breeder. Secondly, the plant breeder brings together the good characters of different varieties by cross pollination of their flowers. Each seed produced by such a cross gives rise to a new variety of sugarcane. Most of these new varieties are inferior to the commercial varieties grown at present and the third process, selection, is used to sieve out the rare superior varieties. Because of variations due to the environment it takes several years to recognise such a superior variety and sort it out from the others.

Sugarcane breeding in Queensland has been very successful indicating that the breeding methods have been satisfactory. However, we cannot assume that the same methods will continue to

Fig. 59—Varieties selected in a bunch planting experiment are carefully measured.

Fig. 60—A three-foot length is accurately cut from the stalk of each selected variety, and internal stalk characters such as pithiness are recorded.

Fig. 61—The selected varieties are laid out in the field for planting. Every fifth space is planted with two setts of the standard variety, Pindar.

produce improved varieties. It may firstly be necessary to progress in our breeding methods if we are to continue to progress in producing new varieties.

There is a continual search for improvements in all stages of the breeding programme. One aspect of this research is concerned with bunch planting. The usual practice is to space each new seedling variety about three feet apart in rows five feet apart. At harvest a field of these original seedlings

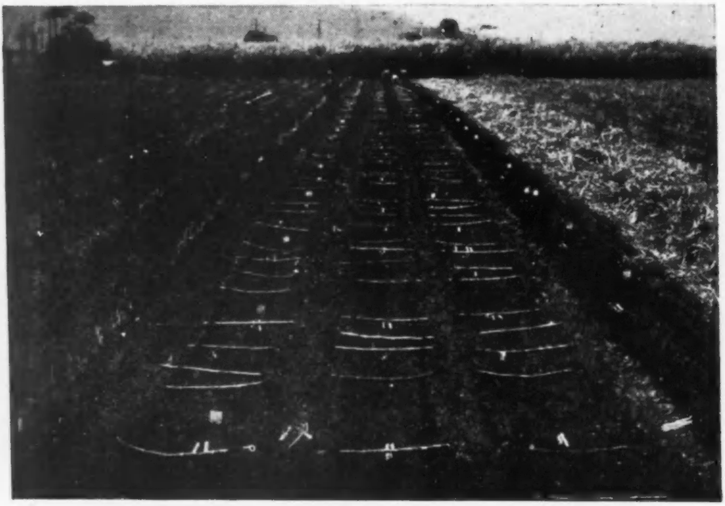


Fig. 62—Each stalk is cut into two setts which are planted side by side.

resembles a field of commercial sugarcane, but each stool is a new variety. Hawaiian sugarcane breeders use a different system known as bunch planting. About ten seedlings are planted together in a bunch and these bunches are planted twice as close together in the field as our spaced seedlings. There is intense competition under these conditions and about half of the varieties die. At harvest each variety is represented by a single stalk, and a given area contains about ten times as many varieties when bunch planted as when space planted. It is obviously to the plant breeder's advantage to have ten times as many varieties from which to choose. However bunch planting is a more laborious method than space planting and selection based on a single stalk may not be valid. There are arguments for and against bunch planting but an experimental approach is the only way to obtain a true answer.

Various stages in such an experiment on the Northern Experiment Station are illustrated in Figs. 59-62. In 1953 flowers of Trojan were pollinated with a mixture of pollen from several male varieties so as to give a wide range of types for selection. The seed was thoroughly mixed and sown. Some of the seedlings were bunch planted and some were space planted. This year 1500 varieties were available for selection from the bunch plantings. The following selections were made:—

(*a*) Best 100 varieties.
(*b*) 100 medium varieties.
(*c*) Worst 50 varieties.
(*d*) 50 varieties selected at random.

These varieties provide a standard with which the other selections may be compared.

Each variety was labelled when selected and all other varieties were cut out and removed. A detailed description was made of each selected variety (Figure 59). It was then cut and laid on the headland. A three foot length was accurately cut from the stalk of each variety and notes were made on internal stalk characters such as pithiness (Fig. 60). In Figure 61 the 300 varieties are shown laid out in the field for planting. Every fifth space is occupied by two setts of the standard variety which in this instance is Pindar. Each new variety is to be compared with the standard and may be identified by its position in the field relative to the standard. The method of planting is shown in Figure 62. Each variety was cut into two setts, the ends dipped in "Aretan," and the setts planted side by side, the varieties being planted three feet apart in the row. In 1955 these varieties will be carefully studied and by comparing them it may be possible to decide whether or not bunch planting has any value under Australian conditions. For example, if the 100 best varieties from the bunch planting are better than the 50 varieties selected at random then bunch planting will have produced an improvement.

This experiment is designed to answer a specific question: "Is selection from bunch planted seedlings effective under Queensland conditions ? " It is possible that the answer will be "No." We would then continue to investigate other aspects of selection with added confidence. On the other hand, bunch planting may prove superior to space planting under our conditions. If so, it may enable us to progress more rapidly in producing new varieties.

The Effect of Fertilizers on Old and New Land in North Queensland

By E. A. PEMBROKE

Prior to World War II, it was a recognised fact that, with the exception of the red volcanic loams, Queensland cane lands were well supplied with potash but that phosphate supplies were low. Farmers were quick to appreciate this and it was the custom to use fertilizers containing a high proportion of phosphates and a relatively low proportion of potash. Since the war the rise in costs has also affected the cost of fertilizers and growers have turned their attention to correct use of these materials in an effort to reduce farm costs generally. In order to do this, many farmers have requested that soil samples be taken and an analysis of these samples has revealed a completely different picture from that of 20 years ago.

Fig. 63—Close up of the Tourneau ripper operating at Edmonton.

Growers in the mill areas from Mossman to Babinda have been to the fore in requesting information regarding the plant food requirements of their farms, and it soon became obvious that the potash content of these soils had been depleted to a large degree. Since 1949 a total of 733 samples have been obtained from old cane lands, ranging through red volcanic loams, alluvials, granite gravels and schists to clay and sandy loams, and an analysis of fertilizer recommendations provides some interesting information.

Total Samples	Phosphate deficient	per cent. of total	Phosphate and Potash deficient	per cent. of total	Satis-factory	per cent. of total	Potash deficient	per cent. of total
Old land 733 ..	33	4.5	163	22.2	180	24.6	357	48.7
New land 130 ..	70	53.85	53	40.77	—	—	7	5.38

From the above table it will be seen that only 4.5 per cent. of the samples taken were phosphate deficient, 22.2 per cent. were low in phosphates and potash but generally considered to be comparatively lower in potash, 24.6 per cent. were considered to have a satisfactory level of phosphate and potash and light fertilizer recommendations were given to maintain soil fertility. The remaining 48.7 per cent. of samples were low in potash and required heavy dressings of a high potash mixture.

During the same period many new and increased assignments were granted as part of the sugar industry expansion programme and a large area of new land has been brought under cultivation. This new land was generally marginal country of clay and sandy loam forest type which was the best available since early settlers had selected their farms with one eye on the proximity to the mill and the other on soil fertility. The fact that this newly cleared land, though poorer in quality, was low in plant foods —particularly phosphates—tends to

substantiate the earlier claims of low phosphate supplies in the cane soils of these mill areas.

An analysis of the second portion of the table shows that of 130 samples obtained 53.85 per cent. were very low in phosphates, 40.77 per cent. were low in both plant foods and only 5.38 per cent. were low in potash but had satisfactory phosphate supplies.

Fig. 64—The Tourneau ripper in "down" position ready for ripping.

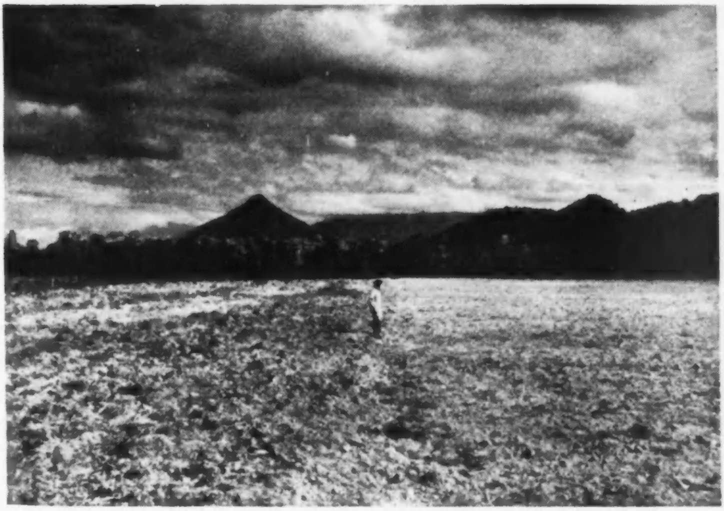


Fig. 65—New land ripped and ploughed at left; ripped, ploughed and disced at right.

In an effort to reduce capital costs many growers when planting this new land were tempted to produce the first crop without the use of fertilizers. The false economy of this practice was brought home to some of them when expected crops were poor and in some cases not harvestable. It is a fact also that fertilizer must be placed in the drill at planting for the crop to benefit. Disappointing results were obtained in instances where fertilizer was applied after it became evident that the crop was not progressing satisfactorily. In comparison crops on similar country, fertilized at planting, yielded up to 30 tons per acre. Growers are cautioned therefore when contemplating planting this type of country to have the soil analysed well in advance and to apply the recommended fertilizer in the drill at planting. It will be found then that the additional cost of fertilizer will be amply repaid by greatly increased tonnages.

Velvet Beans

By G. BATES

With the unsatisfactory results obtained from green manure crops in recent years in North Queensland, growers are again becoming interested in velvet beans. The old Mauritius bean was a velvet bean, but had many disadvantages which made it unpopular with growers, one of which was hard seed which caused it to lie dormant and then germinate in growing cane causing endless trouble. The present velvet beans do not have this habit, and appear at the moment to be the best type of legume available for northern conditions, being resistant to both bean fly and wilt.

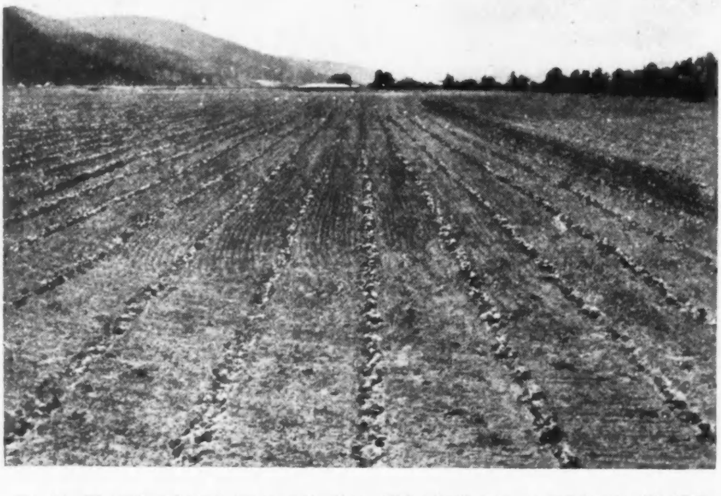


Fig. 66—The velvet beans after germination. This planting was carried out with 17 lb. of seed per acre.

Many growers are now planting velvet beans in rows, with a considerable saving in outlay for seed. The accompanying photographs show two corn planters which have been adapted by Messrs. Clarke Bros. of Gordonvale for the sowing of velvet beans. They are mounted on the standard tool bar of the Ferguson tractor and very little modification was necessary to the machines themselves. It was found that no suitable seed plate was supplied with the machine, but seed plate N 1933 which has the largest holes was used after these holes had been slightly enlarged. The hammer on the seed box was also made slightly heavier to ensure that seeds did not stick in the opening of the chute. Using a combination of sprocket wheels to give the lowest seedling rate it was found that the machines delivered 17 lbs. per acre. It will be noted that the planters travel directly behind the tractor wheels. This is an advantage in as much as the tractor wheels break up clods in front of the planter. One hazard is that old cane stools become entangled in the planter wheels and block the machine, and that is the reason for the extra man whose duty it is to see that no blockage occurs. This trouble would be more or less eliminated if the planter wheel was made in the form of a disc instead of having spokes.

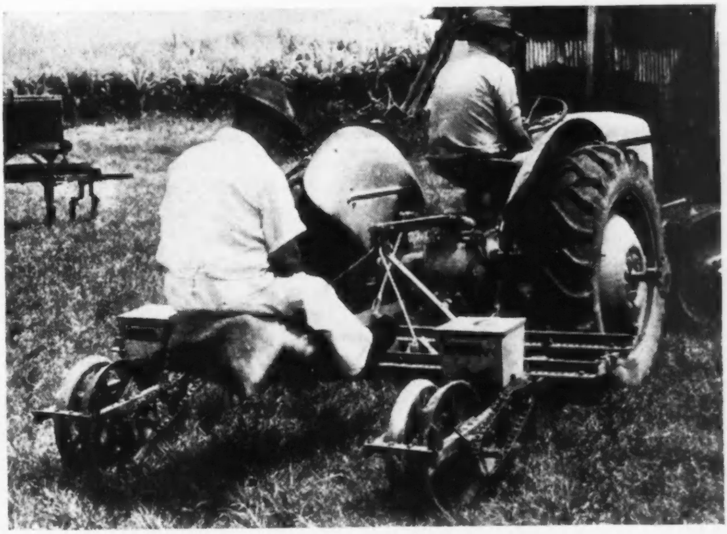


Fig. 67—Corn planters adapted for planting velvet beans.

The second photograph taken 16 days after sowing shows velvet beans planted in rows by means of this machine. The rows are 4ft. 9in. apart and can be cultivated if necessary with sugar cane machinery. From these photographs it will be seen that the rate of sowing could be further reduced. The seed, incidentally, was portion of that imported from South Africa and the excellent germination of it is very pleasing.

Random Gleanings

The South African Sugar Association decided recently to have an aerial survey of the sugar industry in that country carried out; the actual work is being performed by Air Survey of Africa (Pty.) Ltd.

The South African Sugar Journal for July, 1954, records that some 500 miles of photographic flights have already been made and about 1,200 photographs taken. Completed aerial maps of some districts have been printed. These show farm boundaries, roads, tramlines, buildings, streams and field outlines, with the numbers or names and the areas of such fields to the nearest tenth of an acre.

An individual grower can obtain a copy of the map of his property, mounted on calico, at a cost of 9d. per acre. This seems to be an excellent method of recording farm and district boundaries, and the maps would be a valuable asset to both grower and miller.

The occurrence of hail storms in the Queensland sugar belt is by no means common. An article in this issue describes damage which was caused to crops in the Bundaberg district in September, 1954. On this occasion the hail fell on a strip of the South Kalkie-Alloway area.

The last recorded damage of any consequence was in March, 1946—also in the Bundaberg district. On that occasion a strip of country about a mile wide, stretching from the Hummock to Burnett Heads was seriously damaged. Farm buildings, telephone poles and trees were flattened, and cane crops were shredded and pitted by the pieces of hail. An unexpected result of that storm was the increased spread of downy mildew disease which was prevalent in the area at the time; the rapid development of young side shoots on the damaged cane provided an excellent growth medium for the disease and it spread alarmingly. However that disease has since been eradicated and the 1954 hail storm will not create a similar problem.

Although filter mud or rotary filter cake is not a high class fertilizer it does possess a certain value on sugar land. The economics of its use are, of course, related directly to the cost of the material delivered *and spread* on the farm.

In most mill areas contractors take delivery of the mud at the mill and transport it to the farm fields at a specified price per ton. This, however, is not the final cost to the cane grower since he has the additional expense of spreading it from the heaps in which it is dumped.

It should not be beyond the ingenuity of an industry, which has demonstrated its ability to mechanise most operations, to devise a spreader which could be attached to the contractor's truck. Maybe it would be a little slower to have the mud spread by the contractor instead of being dropped in heaps, but it would certainly be faster and cheaper in the long run. What grower would not willingly pay an extra shilling per ton for the mud if it were spread uniformly over his fields ? The tonnage of mud and molasses applied to cane farms each year has now reached big figures. It is about time some thought was given to more economic methods of application.

The amount of red rot disease in sugar cane in the Mackay district during the past crushing season draws attention to the varietal unbalance in that area. Most mill areas are now growing Q.50 to the extent of over 80 per cent. of the total crop. This is not a sound practice even if red rot were absent and cane growers should give serious and immediate thought to

their varietal position. It has happened on more than one occasion in the past, and it will occur again in the future that Q.50 will be severely affected with this disease from mid-season onwards.

The solution is in the grower's own hands. Only sufficient Q.50 should be grown to allow harvesting before the end of September, or, at the latest, mid-October. Canes which are not badly affected by red rot and which are suited for harvesting after that date are Q.28, Q.58 and C.P.29/116.

The time has arrived for planning in this direction. Restriction to peak tonnages may involve standing crops over to the following season. Q.50 is quite unsuitable as a standover variety.

Urea is widely used overseas as a nitrogenous fertilizer in the same way as we use sulphate of ammonia. It is only during the past year, however, that it has been available on the Queensland market in commercial quantities. It is a white, crystalline substance containing 46 per cent. of nitrogen compared with 20.5 per cent. in sulphate of ammonia.

At the present time it is more costly than sulphate of ammonia, even allowing for the much higher nitrogen content, and its use on sugar cane could not be considered. Nevertheless a trial has been laid down on Mackay Experiment Station to assess its value against sulphate of ammonia in crop production. The information gained may be valuable in the future when considering the economics of nitrogenous fertilizers. Who can foretell what the relative prices of the two substances may be in five years' time ?

A couple of photographs in our new pictorial section illustrate the ideal in early cane growth. Both fields were planted with cane free of ratoon stunting disease—cane grown from setts which had been hot-water treated. The absence of gaps, the very good stooling and the rapid progress since planting are all characteristic of freedom from ratoon stunting disease. It would be interesting to calculate how much such fields mean to the cane grower in the way of reduced costs. The quicker germination, the earlier covering in and the elimination of supplying costs are all factors in the cane farm balance sheet. Some growers, with one eye on possible future restriction, may query the benefits of growing larger crops. But surely they can think of better and safer ways of restricting production than by calling diseases to their aid.

From the Louisiana Sugar Bulletin comes the news that N.Co.310 is the most promising new variety awaiting release in that country. It is rare to hear of a cane variety which performs outstandingly in any country except the one in which it was originally bred. An exception in the past was P.O.J.2878 which spread around the world from Java, and of course South Queensland has benefitted considerably from C.P. 29/116, which was raised for the Louisiana sugar industry. N.Co.310 promises to become widely known. It was raised as a seedling cane in Natal from seed imported from India and soon became a major variety in South Africa; it is of some importance in Taiwan, promises to become a favoured cane in South Queensland, and has apparently given above average performances in Louisiana. The wide adaptability of a cane variety to such a range of sub-tropical conditions is a tribute to the hardiness of modern hybrid types.

Experience on the rich alluvial lands of the Abergowrie area suggests that some modern cane varieties may be too vigorous for those hot-house conditions. Many crops have grown rankly and, in addition to being low in sugar, they have attracted high cutting rates because of their lodged nature. There is obviously room for extensive experimentation with sweeter, less vigorous

types. During the 1954 spring planting season a range of new seedling canes, bred by the Bureau at Meringa Experiment Station, was introduced to the area and these were planted on river farms at Abergowrie; all of these have already proved at Meringa to possess high sugar content. New introductions will be made each year. The particular purpose of this work is to find varieties for this sub-district which will remain erect, give good sugar content and be harvested at Award rates.

A farm weed known as wild heliotrope (*Heliotropium amplexicaule*) which is widespread in parts of the Bundaberg and Isis districts is proving very resistant to plant poisons and other weedicides. Although not a pest in cultivations, except where cane is stood over, it can rapidly take control of grass paddocks. Its resistance to even arsenic pentoxide is due to the large roots which produce new plants when the original crown is killed. All the usual weedicides have failed to control it to date but some hope of success is given by 2,4,5-T, a weedicide which is often effective on certain woody plants not controlled by 2,4-D.

We reported briefly last year on a new pre-emergence weedicide which prevented the germination of grasses but allowed the development of broad-leafed plants. It was pointed out at the time that it would have little, if any, application in the sugar industry, since 2,4-D prevented both classes of unwanted plants from growing. Overseas publications show that the new material, Chloro-IPC is now successful on a commercial scale in such crops as cotton. After the cotton seed is planted, the ground surface is sprayed with the chemical and control is achieved over all grasses; the cotton plants come through unharmed and grow all the better in the absence of grass competition for moisture and plant food. There is doubtless a place in Queensland agriculture for this chemical—particularly in vegetable crops, peanuts, etc. On an American cotton property it is claimed that its use reduced hoeing costs from $15 to $1.18 (£6/12/6 to 10/6) per acre.

Queensland sugar cane farming is frequently quoted as an example of mechanical ingenuity. A note in Spreckels Sugar Beet Bulletin indicates that American sugar beet growers are straining every nerve to reduce costs and compete more effectively with the sugar cane industry. Home made, sled-mounted planting combines have been developed which, in one operation, prepare beds, fertilize, rotary till, roll and plant four rows of sugar beet seed. At a speed of 2½ miles per hour, the machine covers four acres per hour. To ensure continuous and uninterrupted operation, the designers have installed catwalks and platforms so that the operator can keep seed and fertilizer hoppers full at all times while the machine is in motion. The sugar beet industry has always been highly mechanised in other directions. All thinning of plants is performed mechanically, and the mature beets are topped, dug, separated from adhering soil and loaded by machine. It is, of course, a much easier crop to handle than is sugar cane, but the beet growers have given proof of their ability to reduce manual handling to a minimum.

The Bureau's Pathology Farm at Eight Mile Plains, some twelve miles outside Brisbane, now contains some six and a half acres of current disease resistance trials. It is imperative that the susceptibility or resistance of every new cane variety, whether locally bred or imported, be known so that control measures may be instituted immediately if a disease outbreak occurs in any district. At the present time, the

resistance of a large number of canes is being tested for ratoon stunting disease, gumming, Fiji, red rot, leaf scald and scale insect. A few years ago such trials were conducted in sugar districts, but with the elimination of many of our diseases from commercial crops the Bureau decided to transfer all such work to a safe area. The Pathology Farm is, in some respects, a living museum. It is the only spot in Queensland where downy mildew and gumming diseases are known to exist and it contains a collection of minor diseases which would quicken the heartbeats of any sugar cane pathologist.

Front-end loaders promise to become a feature of the cane farming landscape before long. The movement began with the development of the Quaid loader some years ago, and during the 1954 season successful demonstrations were given with the Porter and Nuffleigh front-end types. At present these are designed for attachment to Ferguson, Fordson, I.H.C. and Nuffield tractors. There is no doubt regarding their success in rapid loading of short, long, straight or bent cane and a loading rate of two tons in five minutes was reached with the Nuffleigh on a 50 ton per acre Pindar crop. Mechanical loading presents less engineering difficulties than does mechanical harvesting and the price of an attached front-end loader is within the reach of an average-sized grower. It is understood that already large numbers of these loaders have been ordered by cane growers, and they should make a valuable contribution to the maintenance of cane supply in 1955. Cane supply is seriously affected by wet conditions during harvesting; some of these loaders have demonstrated their ability to work under conditions which would be too soft underfoot for manual loading.

Owners of power driven boom sprays on which the green house type nozzle is used, and growers constructing equipment for their own use will be interested in a suggested dropper modification. The method at present in use provides for the nozzle to deliver the spray at an angle of about 45 degrees to the line of travel while the new set up delivers the spray almost at right angles to the line of travel. Delivery in this manner allows the machine to be used during relatively windy conditions when many growers are not keen about applying pre-emergence spray because of the drifting which takes place. The alteration consists of a substitution of the perpendicular dropper by an M. and F. bend, into which is fitted the nozzle assembly, and can be made by any handy grower.

The Bureau receives mail regularly from practically every cane producing country in the world and on account of this and the visits which various Bureau officers have made from time to time to overseas countries has developed an international outlook in keeping with the nature of this world-wide sugar industry. Direct communication with other countries by cable and wireless is not uncommon but it did come as a surprise quite recently to find one Mr. Lloyd L. Lauden of New Orleans, Louisiana, U.S.A., calling the Bureau pathologists per telephone. Mr. Lauden is Agronomist and Field Representative of the American Sugar Cane League of the United States of America, and wanted to discuss hot-air treatment of setts for the control of ratoon stunting disease. Reception was excellent, even though the conversation was cut at one stage for some minutes. It is reported that there was more difficulty with Mr. Lauden's slow southern drawl than with the reception.

Pathologist from Trinidad visits Queensland

Ratoon stunting disease was first discovered in Queensland and the early experimental work done here was responsible for laying the foundations of our present knowledge of the disease as well as directly leading to its discovery in other cane producing countries. Pathologists in all parts of the sugar world are now intensely interested in the disease and a great amount of research is under way. The research has, of course, been continued in Queensland, and it was felt that the extensive programme of yield trials in all parts of the Queensland sugar belt and the experimental plantings at the Pathology Farm at Eight Mile Plains continued to maintain Queensland's position as leader of research into the disease. This opinion has very gratifyingly been confirmed by two eminent cane pathologists who recently made special visits to Queensland to study the Bureau investigations.

The visit of Monsieur M. H. Barat from Madagascar was mentioned in the last issue of the *Cane Growers' Quarterly Bulletin*, but since then we have been favoured by a visit from Mr. P. B. Hutchinson, who is Senior Lecturer in Plant Pathology at the Imperial College of Tropical Agriculture in Trinidad, British West Indies. He was shown the work in progress on ratoon stunting disease at Mackay and Bundaberg and discussed general disease problems there and at Eight Mile Plains. Several diseases, such as downy mildew and sclerospora disease, Mr. Hutchinson had not encountered before, but both he and the Bureau pathologists had much to discuss on leaf scald, which is very serious in British Guiana, and on chlorotic streak, which is found everywhere in the British West Indies except on Barbados. Mr. Hutchinson has himself commenced some work on ratoon stunting, which Mr. Steindl had shown to exist in the British West Indies on his visit there in 1953, and his results are awaited with interest.

—C.G.H.

Fig. 68—Mr. P. B. Hutchinson, Pathologist from Trinidad, during a tour of Queensland cane areas.

Combating the Soil Erosion Problem in the Childers Area

By N. McD. Smith

During 1947 the first controlled contour experiment (1) to arrest soil erosion was laid in the Childers area. The trial was placed on a slope having a maximum gradient of 16 per cent. At this time, information in regard to a suitable layout under sugar cane growing conditions was limited, and a safe basis related to other crops was adopted. Much was gained from the experiment and resulted in a closer understanding of the problem as it applied to the red volcanic loams of the district. The ideas gained were incorporated in later layouts throughout the area and the extension of a soil conservation consciousness spread quickly amongst growers. This has resulted in the recent full time appointment of a Department of Agriculture and Stock officer stationed in Bundaberg who will maintain close liaison with the problem.

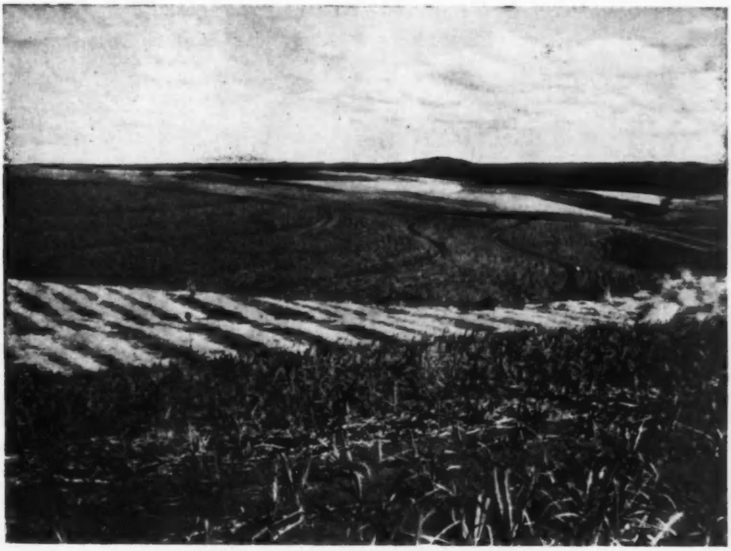


Fig. 69—A contour planting in the Isis district.

The difficulties experienced in the initial work were many, but as further areas were contoured in later years, information gained was applied to the next project until current layouts, on reasonable slopes, are now faced with but one major disadvantage. To appreciate such progress it must be realized that on American standards, slopes of greater than eight per cent. should not be utilized for cultivated crops but be given over to pasture. Accepting this basis, imagine the task of combating soil losses over hundreds of acres of a friable loam having 12-16 per cent. slopes—double the recognised allowable maximum!

From the first stages of the work the greatest obstacles to be overcome were:

1. Widths between contours varied so that "point rows" were unavoidable. Establishment of plant crops proved relatively simple and followed the regular system, but row cultivation

throughout the crop cycle proved difficult as implements were required to cross over other rows and turn about in the middle of the field; and, further, the usual awkward situations met in harvesting the field became accentuated.

The points raised are indicated in Fig. 69, which shows a 1954 contoured field having unfinished rows between the contours.

2. The removal of runoff from a contour ditch necessitates a waterway led through the lowest portion of the field. Such portions are invariably the highest cane yielding spots and establishment of such easements resulted in some loss of good land.

3. The construction of wide contour banks often absorbed an appreciable percentage of tillable land, and each bank had to be maintained in a clean condition to allow an unimpeded flow of water.

In addition to the above there were other difficulties which applied to a specific site, for instance, the use of a wheeled tractor on some contours was found to be unsuitable due to "crabbing" and too wide a turning radius for "point rows."

It speaks well of the officers concerned in the task that the main difficulties quoted have been overcome except for the inclusion of "point rows" in the field. Overcoming the setup will perhaps require a modification in design as compared to previous layouts and this is being critically examined at the moment. However, the importance of a change in design is reduced by the fact that the crop could be removed by lorry and thus eliminate part of the harvesting inconvenience.

It is hoped that further work will confirm the basic soundness of current contour layouts and will also aim at increasing the holding capacity of the soil by surface mulching. Trials are to be initiated on a fairly large scale this year to chop up green manure residues with discs, and to plant cane through the protective organic matter blanket. The method has been tried previously on a small area and considered satisfactory, and is now to be incorporated in a controlled scheme. Preplanting cultivation will be thorough so as to allow penetration of the planter mouldboard. In addition, pre-emergence sprays will be used to minimise soil disturbance and thus assist in arresting downhill transporation of soil.